DOCUMENT RESUME

ED 126 648 EC 090 564

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TITLE	Program Evaluation of Special Education Curricular Efforts in Both Self-Contained Classes and Resource Rooms: The Use of a Modified Case-Study Approach with Both Normative and Criterion-Referenced Data in a Complex Service Delivery System to Help Address the Problem of Extreme Variability.
INSTITUTION	Montgomery County Intermediate Unit 23, Blue Bell, Pa.
PUB DATE	Aug 76
NOTE	49p.
EDRS PRICE	MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS	Behavioral Objectives; Case Studies; *Curriculum Evaluation; Exceptional Child Research; Individual Differences; *Learning Disabilities; Longitudinal Studies; *Research Methodology; Research Problems; Resource Centers; Special Classes; *Statistical Analysis; *Statistical Data
IDENTIFIERS	*Variability

ABSTRACT

The problem of variability of data, even in presumable homogeneous subgroupings of handicapped children, which contaminates the results of many special education curriculum evaluation studies is examined with a study of 103 second-grade learning disabled students. The distortion of statistics calculated on samples of extreme variability; coupled with polymodality, skewedness, or kurtosis, is discussed. The case study approach is offered as one way to help balance the presentation of results. An example is presented using standardized test data and longitudinal criteron-referenced measurement data from both self-contained classes and resource rooms collected in 1971-1972. Approximately two-thirds of the report consists of tables and statistical data. (Author/IM)

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ED126648

PROGRAM EVALUATION OF SPECIAL EDUCATION CURRICULAR EFFORTS IN BOTH SELF-CONTAINED CLASSES AND RESOURCE ROOMS: THE USE OF A MODIFIED CASE-STUDY APPROACH WITH BOTH NORMATIVE AND CRITERION-REFERENCED DATA IN A COMPLEX SERVICE DELIVERY SYSTEM TO HELP ADDRESS THE PROBLEM OF EXTREME VARIABILITY

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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August, 1976

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EC090564

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ABSTRACT

A perennial problem that has contaminated the results of many special education studies has been the extreme variability of data, even in presumably "homogeneous" subgroupings of handicapped children. Any statistics (such as the average) calculated on such samples is bound to be quite distorted. Extreme variability, coupled with polymodality, skewness, or kurtosis, of any type of group-average information very suspect. The case study approach is one way to help balance the presentation of results. While group-average data can still be reported, the specificity of the case-study approach forces the reader to hone in on the distribution problems that greatly restrict the generalizability of the group-average data. An example is presented using standardized test data and longitudinal criterion-referenced measurement data from both self-contained classes and resource rooms collected in 1971-1972 by the investigators from the National Regional Resource Center of Pennsylvania, the predecessor of the current National Learning Resource Center of Pennsylvania.

ACKNOWLEDGEMENTS

This report is a type of historical note to some pioneer efforts in curriculum and measurement systems development that occurred in the late 1960s and 1970s for one of the first few of the several National Regional Resource Centers (RRCs) that developed across the country for the handicapped. Apart from the authors, several other individuals contributed heavily to these efforts. In particular, the several teachers and master itinerant personnel provided much formative evaluation feedback: Bruce Bischoff, Ronald Brown, Paul S. Redelheim, Marilyn Fitzgerald, Marianne Price, Joyce Ness, Molly Stitt, Harry Freedman, and others. Finally, much rearranging of this material in a tabular and graphical sense and the actual typing has been ably provided by Mrs. Judy Rizzo.

INTRODUCTION [1]

Previous reviews of accountability problems in dealing with handicapped children (Proger, 1971a; Proger, 1971b; Proger & Mann, 1973a; Grotsky and Proger, 1975) have shown the enormity of the task of tyring to unravel the various curricular threads of what is really a complex "package." (Proger, Carfioli, & Kalapos, 1973). A special education teacher's efforts, even moreso than those of a regular education teacher, always involve an eclectic selection of instructional materials (alias "gimmicks"), curriculum software (commercially available reading and arithmetic "series"), constantly varying techniques of implementation, and so on. Is it any wonder that curriculum researchers and program evaluators have had such difficulty in trying to establish credibility of their efforts? One is dealing with a continusously varying, highly complex "black box" that no doubt will never be successfully addressed by program evaluation efforts. This has been the "curse" of the usual resource-room evaluation study (e.g., Sabatino, 1971). The purpose of the present report is to present the results of a modified case-study approach that was applied to one of The first National Regional Resource Centers for the handicapped: Tha National Regional Resource Center of Pennsylvania (NRRC/P).

This report provides data gathered under both self-contained class and resource-room conditions. In both situations, the subjects were learning disabled children. The classes and rooms were spread throughout the suburban region of the Greater Philadelphia Area. This report also describes in connection with the self-contained classes the evaluation of the first criterion-referenced measurement (CRM) systems devised for special education in both reading and arithmetic: the Individual Achievement Monitoring System (IAMS), as it was known in 1971-1972, the time of the data collection.

The reading version of the IAMS was revamped several times until it became the now-commercially available Curriculum Management System (CMS; Mann, Proger, Cross, Ewell, Redelheim, & Kalapos, 1975).

GENERAL METHODOLOGY

The typical approach to evaluating special education programs in either self-contained or resource-room settings is to gather standardized (norm-referenced measurement, or NRM) test data and to generate averages at either the class or program levels (see Proger, 1971a). Structured interview feedback is also often obtained from the professional staff (see Grotsky & Proger, 1975) and occasionally even students. Finally, perhaps structured pupil rating scales, to be completed by the teacher, are used (Proger, 1973). The basic dilemma of such group averages, however, is the usually extreme variability hidden by virtue of the averaging process itself. While group-average data (class level, building level, supervisor level, program level, or whatever) is generally acceptable in normal education where the presumption of a relatively normal curve can be upheld, this is rarely the case in special education, no matter what the severity of the handicapping condition might be.

There are at least two problems, both interrelated in a distribution sense, that create these severe validity restraints of the data usually collected in special education: (a) the extreme variability of handicapped students of a particular exceptionality, even when they presumably have been grouped in a relatively "homogeneous" fashion (e.g., by age and/or intellectual potential); and (b) the skewness and/or kurtosis that often prevail in the data distributions of handicapped students.

What does one do about these problems? Clearly, the answer is not to resort to the abolition of data averaging altogether. To the contrary, one

must seek additional methods of data collection, reporting, and synthesis that will complement rather than replace. One such technique is the case-study approach, hardly a novel idea in any way, shape, or form. However, to apply the case-study approach to handicapped-student data by means of using both CRM and NRM measures, and balancing such a reporting format by the "abominable group averages," is perhaps a little unusual, particularly in special education. This report will attempt to illustrate this technique by applying it to learning disabled children who were being served in self-contained classes and resource rooms by the National Regional Resource Center of Pennsylvania during 1971-1972. In this sense, the report is a type of historical note to the period when CRM was first being looked at as a concept in and of itself by special educators (Mann, Proger, & Cross, 1973).

The report will proceed as follows. With the reader bearing in mind the fact that the overall Gestalt of the methodology is a case-study approach, the actual empirical examples will be discussed in two major sections: (a) CRM, and (b) NRM.

STUDENTS

Self-Contained Classes: There were 29 learning disabled children from the suburbs of the Greater Philadelphia Area. The pupils should have been in third grade but failed second grade and thus exhibited severe learning problems. The pupils were screened rigorously by certified school psychologists to ensure that at least normal intellectual potential was present and that no other handicapping conditions were present (such as visual, auditory, or speech impairment). The 29 children cam from normal school classes of regular size and were placed into 3 special learning disabilities classes of the National Project; each class had a maximum size of 10. While the sample size is small, it must be remembered that an enormous amount of data has been generated daily in a way never before found in classes for the handicapped.

To manage this data in an efficient way, the size of the IAMS field test project was deliberately kept small. The CRM data was gotten only from these three classes, since these were the only project sites at which the specially developed reading and arithmetic curricular and CRM materials were systematically supervised and data-monitored. Of oource, NRM data was also collected on these children. See Table 1 for detailed background (ID numbers 1 to 40).

Resource Rooms: There were 74 learning disabled students enrolled in the National Project resource rooms during 1971-1972. The background characteristics of these children were similar to those in the self-contained classes, but the severity of the learning disabilities problem was not as great in the resource rooms. See Table 1 for detailed, case-by-case background data (ID Numbers 101 to 264). The resource room children received a variety of instructional materials and techniques, as opposed to the self-contained class children who received the project developed reading and mathematics programs. Only NRM data was collected on the resource room children.

INSTRUCTIONAL [2]

NRM: The Wide Range Achievement Test (Level 1) and the 1964-1965 Stanford Achievement Test (Primary Battery I, II) were administered on a pre-post basis to provide normative measures of achievement. For purposes of analysis, the data were grouped into temporal categories according to the spans between testing. Case-study data was the primary emphasis. However, mean gain scores for each group were computed for the subtests in terms of the converted grade equivalent scores. Grade equivalents were used in lieu of raw scores in order to ascertain a more meaningful significance for the layman.

CRM: For years, teachers have been using the strategy of diagnose, teach, and evaluate: one sees where a child is, tries to take him further, and assesses his progress. The procedure seems to fall into and out of repute depending upon the "instructional mores" of the time. If educational writers are espousing diagnostic-prescriptive teaching at the time, then the test-teach-test procedure is "in". On the other hand, if writers are currently blasting the reliability and validity of teacher-devised tests, then the test-teach-test procedure is "out". Clearly, there is some truth in either position, but as with most things, compromise is possible and usually highly desirable. Mastery learning has entered the educational scene as such a compromise attempt.

In essence, mastery learning consists of applying a formalized test-teach-test schema to instruction that is based upon a careful task analysis of the curricular hierarchy. Instead of using the test-teach-test design to instruct the group, the teacher instructs the individual. Accordingly, the tests used in this instructional design are not scored and interpreted relative to the performance of other children, but rather an absolute mastery level is predetermined for later success in the subject-content area. Thus, the term "mastery learning." This paper describes the results obtained by using the mastery learning approach in both reading and arithmetic with learning disabled children.

To get around the usual criticisms of teacher-made tests, and even moreso to provide teachers with readily available measures when they do not have time to make their own, a system of behavioral objectives and highly specific tests were developed to accompany the commerical reading and arithmetic series that teachers were using in the project. (The approach described here, however, can be applied to any commercially available reading program or arithmetic program and thus has generalizability in that sense).

The testing system thus developed was termed the Individual Achievement Monitoring System (IAMS); also see the most recent version, CMS, devised by Mann et al, 1975).

The original IAMS was an easily used classroom management system designed to facilitate day-to-day teacher decisions about instructional programing for mentally handicapped children who are taught either in an individualized setting or in small groups. No matter with what particular curriculum it is employed, the IAMS consists of three basic components: (a) a series of easily understood behavioral objectives that map out an instructional program in any given subject-content area, (b) a series of tests that parallel the objectives, and (c) a commercially available program in the subject-content area of interest. The teacher can use the objectives in mapping out her instructional program on a day-to-day basis. The tests available to the teacher are designed to give her a ready-made assessment of student achievement with respect to the selected objectives at any point in time. The objectives and tests of the IAMS help the teacher make day-to-day decisions that are referenced and coded directly with the commerical instructional program being used with the series.

The IAMS draws heavily upon many of the current trends of instructional technology. First, there is a wealth of research to support the premise that children benefit from frequent, systematic testing (see Proger & Mann, 1973b, for a comprehensive review in this area); not only do frequently given tests provide the teacher with precise information on how her students are progressing academically, but the tests also serve as a learning device for the students themselves. It is thus strange indeed that handicapped children have suffered from "test deprivation"; other than diagnostic placement testing, little followup testing of the children's progress is made. Second, the IAMS bases its testing program upon the philosophy of criterion-referenced measurement

(CRM). CRM is usually defined in distinction to its counterpart, standardized testing. With standardized testing, the individual student is pitted against group norms; that is, one is interested in comparing a given child's performance with respect to others. On the other hand, CRM provides absolute assessments of a child's performance against pre-established standards of mastery; the child competes only against these absolute standards in terms of the levels of mastery specified by the teacher. In CRM, the child is compared not to a population of children (as with standardized testing) but to a population of academic behaviors (see Proger & Mann, 1973a, for a review of CRM practices in special education). Third, the IAMS makes use of precisely written behavioral objectives to help the teacher specify her instructional goals as much as possible; IAMS provides the teacher with prepared objectives rather than asking her to devise her own.

The IAMS is an innovative approach, but it is one that enters the educational scene with much research and development already completed. Extensive field testing in applying the approach to one commercial reading series and one commercial arithmetic series has been carried out in the state of Pennsylvania. This field testing is continuously expanding. The agency through which the 1971-1972 field testing was conducted is the National Regional Resource Center of Pennsylvania (NRRC/P; later changed to the National Learning Resource Center, NLRC/P). Nonetheless, most of the development of the IAMS has been carried out by staff members affiliated with the Montgomery County Intermediate Unit, which is an agency separate from the National Center. During the 1970-1971 academic year, this staff surveyed the state of the art in objectives-based testing systems that could be used with both groups and individuals and did some preliminary work on developing the system. Initial development of IAMS, including writing the instructional objectives, took place during the 1971-1972 academic year. Also during that

year, extensive field testing took place, which data is the subject of the present report.

During the 1971-1972 academic year, a curriculum-embedded, testing-and-objectives management system was devised. That is, existing commerical programs in given subject areas were selected as models of curricular sequence. Instructional objectives of a specific, day-to-day type were then written to reflect the sequence of instruction implied in the commercial program; finally, test items were written for each objective. The commercial program's sequence of curriculum was broken down into estimated two-week units of instruction (referred to as "modules"). Test items were written for the objectives within each unit of instruction and compiled into test booklets (called "monitors"). The 1971-1972 model of objectives-and-testing teacher management system was "curriculum embedded", i.e. specific to the curriculum used. The same sequence of objectives and test items could not be used with different curricula without major changes in sequence and additions or deletions in content.

The basic philosophy of the Montgomery County Intermediate Unit in dealing with instruction and remediation of handicapped children has been presented elsewhere (Mann & Phillips, 1967, Mann, 1969, Mann, 1970; Mann, 1971) and will be only summarized here. Rather than "fractionate" a child's abilities into many isolated "faculties" and then try to build a training program to remediate particular deficiencies, Montgomery County (PA) takes the view that if basic academic competency in reading and mathematics are necessities for functioning in the real world, then reading and mathematics should be taught directly. The staff does not believe that training visual perception, motor coordination, auditory discrimination, sequential memory, etc., will ultimately have a beneficial, long-range impact on the reading and mathematics skills.

CRM and the Reading Program: The reading program selected as appropriate to the needs of children with learning handicaps was a highly structured linguistics approach, with a very systematic treatment of word-attack skills. Once a reading program was found that the National Project felt was structured enough to handle the chronic academic failure of their handicapped children, the next step was to delineate the entire reading program into highly specific behavioral objectives. In Table 2, one sees brief descriptive phrases for each behavioral objective that was needed for instruction during the first year of the IAMS (this table does not, by any measure, reflect the entire range of objectives of the IAMS). It should be noted that Table 2 does not contain the bahavioral objectives used by the project, but only the essence of each objective. The range of objectives in Table 2 is roughly from readiness level through the end of second grade.

After behavioral objectives were written to map out a reading curriculum for K-3, test monitors were written to reflect the objectives and to guide instruction. Each test monitor, in general, embodied word attack skills. To assess specific processing difficulties, every attempt was made to reflect appropriate combinations of auditory/vocal and visual/motor input and output in each work attack skill. Each monitor also assessed elementary comprehension skills in terms of naming a word presented in isolation, identifying a word when presented with two distractors, and identifying proper contextual usage of words in sentences. Finally, on certain monitors syntax skills were assessed whenever they occurred in the curricular sequence.

CRM and the Mathematics Program: Because the primary academic deficiency of the children served by the National Project was reading, any attempt to carry out instruction in non-reading areas had to minimize reading problems. Thus, a search was undertaken for a mathematics program that was structured and yet avoided verbiage.[4] Table 3 contains brief phrase descriptions taken from

more precisely stated behavioral objectives for only that portion of the curriculum that was needed by the particular group of children involved in the 1971-1972 field test of the IAMS. The grade level represented in Table 3 is roughly second grade, since the majority of children involved in the first year of the IAMS were measured as functioning at this level.

Operational Structure. For any module of instruction, the teacher uses a monitor to gauge the child's progress. This monitor can be used in a variety of ways. For those teachers who intend to use the system to individualize instruction, the monitor can be used in a test-teach-test fashion. That is, after a child takes the first monitor (pretest), the teacher can decide which concepts in the unit of instruction the child has already grasped; she thus avoids redundant teaching and the child moves on to take the pretest on the next module. On the other hand, specifically for those skills the child does not have mastery of (as shown by the pretest), instruction is scheduled. The child is given a posttest to assess his mastery after instruction; if he has not yet achieved mastery, he is given more instruction and then another posttest. The cycle is repeated at the discretion of the teacher until mastery of the particular unit is achieved. An IAMS monitor can serve as a basis for intensive diagnostic follow-up because it covers both the auditory and visual areas in the reading process. A major benefit of the IAMS monitors is that evaluation becomes as much a part of teaching as the regular instruction itself.

The IAMS is not viewed as a program to be pitted against alternative instructional approaches and thus evaluated in a formal research design. Rather, the IAMS is a method of gathering data on any instructional program. Such data is to be used primarily as a means for the teacher to make day-to day instructional decisions for the individual child. Thus, the data contained in the present report is to be considered more descriptive in nature

than comparative/judgmental. There is no control group as such in the present study. Rather, the children serve as their own controls. In effect, the IAMS has been applied to a group of learning disabled children who were complete academic failures in reading and mathematics in traditional instructional settings; the pupils had shown no gains in either of these two areas during the previous academic year (1970-1971). Hence, if the average child performance could be raised even a half of a grade level, the IAMS might be deemed effective.

ILLUSTRATION OF THE MODIFIED CASE-STUDY APPROACH: NRM DATA

In Table 1, the reader sees at a glance the nature of the case-study approach. All children are presented in anonymous fashion, as would be required by confidentiality (see Fischman & Proger, 1975). The reader of such a report is forced to focus in on the great degree of variability present in such handicapped-child data and hopefully not make any sweeping generalizations, which is unfortunately what usually happens when group averages are given.

However, even the present investigators would have to admit that case-by-case presentations often lead one to asking for a quick "feeling" of what the general trends were. Thus, in Table 4 the "group-averages approach" is presented for both self-contained classes and for resource rooms. The point to be made, however, is that the data in Table 4 are to be considered secondary to the data in Table 1. In any program interpretation report of such group-averages data as in Table 4, severe restrictions must be stated in no uncertain terms; such qualification is virtually never done.

ILLUSTRATION OF THE MODIFIED CASE-STUDY APPROACH: CRM DATA

To see just how the IAMS can "monitor" a child's performance thoughout the year, the performance of the child #18 (one of the slower students) has been plotted in Figure 1. The mastery level is given along the vertical axis in terms of percent correct, while the objective number (refer to Table 2 for descriptions) is given along the horizontal axis. In mastery learning, one is interested in giving heavy instructional efforts to those objectives the child has done poorly on with the pretest, and on the other hand avoiding those objectives the child already demonstrates mastery on. For child #18, little instruction is necessary on the first 10 objectives, for objectives 60 to 80, 95 to 115, and 130 to 145. However, over the rest of the range of curricular content, the child needed at least partial instruction.

Typical case-study profiles could be plotted for various types of children: high-IQ vs. low-IQ, severe reading deficit vs. moderate reading deficit, and so on. Such objective-by- objective data gives a longitudinal case-study view of how a given handicapped child is progressing. In fact, one can consider Figure 1 to be a possible CRM-oriented report card. Thus such a document can not only be used at the program evaluation level (in a case-study, graphical fashion), but can also serve as the topic of discussion for parent conferences.

Just as with the NRM illustration above, the investigators also feel a group-average graphical approach is of value, <u>if properly qualified</u>. Figure 2 shows objective-by-objective progress in reading of the 29 self-contained class children over the course of the school year (again, a longitudinal study). Figure 3 shows similar information for arithmetic. In both cases, the objective codes can be deciphered by referring to Tables 2 and 3, respectively.

FOOTNOTES

[1]The preparation of this paper was aided by two grants to federal projects for which the Montgomery County Intermediate Unit is the local education agency: (a) Pennsylvania Resources and Information Center for Special Education (ESEA Title III: R-22-H, 48-70-0003-0), and (b) National Regional Resource Center of Pennsylvania (ESEA Titles VI and III: OEG-2-70-0051; 48-1919-SC-699). However, the views contained herein are solely those of the authors and no endorsement on the part of Montgomery County, PRISE, NRRC/P, or the U.S. Office of Education, is to be inferred.

[2]The investigators were greatly assisted in the development of modified curriculum materials and CRM exercises by Ronald Brown, Harry A. Freedman, Paul Goode, and Marilyn Fitzgerald, Paul S. Redelheim, and Bruce Bischoff.

[3]The reading program consists of Prebook through Book 20 of Steps in Reading by Glim (1968). This series is also referred to as the Palo Alto Reading Program (1st ed.)

[4]The mathematics program consists of the Mathematics Readiness Kindergarten Book and the Mastering Mathematics Books *, A, and B from Sadlier Publishing Company (1969-1970).

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TABLES

TABLE 1 (PART 1)

NRM CASE-STUDY DATA

Gain Data

I.D. Number	Sex[a]	Age[b]	WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science &Social Studies	Interim[d]	Pretest	Posttest
1	M	95	106	107	107	.1	.1	-.2	2	1.1	1.7	1.1	1.9	1.7	0	1.7	1.8	7	Pr.-II	Pr.-II
2	F	104	103	108	106	1.1	.4	.3	2	-.2	.7	.6	.9	.9	-.7	.7	.2	7	Pr.-II	Pr.-II
3	M	104	118	117	119	-.9	-1.0	.3	2	1.1	1.6	1.3	1.7	1.4	.9	1.6	2.2	7	Pr.-II	Pr.-II
4	M	112	105	100	103	.7	2.0	1.0	8	.5	.6	.9	1.4	1.5	1.6	1.1	.5	7	Pr.-II	Pr.-II
5	M	109	106	97	102	.3	.9	0	2	1.4	1.6	1.1	1.0	.9	1.0	.5	2.4	7	Pr.-II	Pr.-II
6	M	108	97	104	101	.6	1.3	.6	8	1.1	.9	.7	.9	.4	.9	1.7	.8	7	Pr.-II	Pr.-II
7	F	95	101	68	84	.5	.2	.2	2	.8	.9	2.3	2.6	1.8	1.2	1.1	.5	7	Pr.-II	Pr.-II
8	M	104	99	99	99	1.0	.4	0	2	1.2	2.5	2.5	1.1	1.4	1.2	1.8	1.5	7	Pr.-II	Pr.-II
9	M	113	120	110	117	1.2	1.9	2.1	8	1.5	2.0	.7	1.7	1.4	1.8	.8	1.5	7	Pr.-II	Pr.-II
10	M	102	97	104	101	0	2.1	2.4	3	1.4	1.4	.2	1.0	1.3	1.1	1.6	.2	7	Pr.-II	Pr.-II

TABLE 1 (PART 2)

NRM CASE-STUDY DATA

			Gain Data																	
			WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
I. D. Number	Sex[a]	Age[b]	Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science &Social Studies	Interim[d]	Pretest	Posttest
16	M	85	105	103	104	---	.2	3.1	3	1.4	.5	1.6	3.6	0	.7	---	---	7	Pr.-I	Pr- I
17	M	96	87	97	91	---	1.8	2.1	1	.9	.8	1.3	1.4	.1	---	---	---	7	Pr.-I	Pr.-I
18	F	94	119	96	109	1.8	1.0	2.6	7	1.9	1.5	1.5	---	---	---	---	---	7	Pr.-II	Pr.II
19	F	88	NA.	N.A	N.A	1.1	.3	1.0	8	.2	1.3	1.0	1.3	-.4	.5	---	---	7	Pr.-I	Pr.-I
20	M	84	99	127	113	.6	.7	1.8	12	.4	.7	---	---	---	.9	2.1	---	7	Pr.-II	Pr.-II
21	M	96	106	104	106	N.A.	.2	2.1	12	1.0	.5	.8	1.5	.1	1.4	1.3	---	7	Pr.II	Pr. I
22	F	88	100	90	95	N.A.	.4	1.3	12	.7	1.4	1.0	1.2	.4	.2	---	---	7	Pr. I	Pr. I
23	M	97	103	139	122	1.3	.9	1.7	19	-.1	-.3	.4	1.1	2.0	1.0	---	---	7	Pr.II	Pr. I
24	M	100	82	115	98	2.8	.4	2.4	10	.5	1.2	2.0	---	---	.9	1.3	---	7	Pr.II	Pr.II
31	F	83	114	92	104	1.0	.9	.6	8	.6	0	.9	.8	2.3	1.0	---	---	8	Pr. I	Pr. I
32	M	113	96	82	88	1.0	0	1.7	8	.6	.9	0	.6	0	1.5	---	---	8	Pr. I	Pr. I
33	M	122	81	111	95	.5	1.1	1.0	8	.6	.2	1.1	1.1	1.4	1.9	---	---	8	Pr. I	Pr. I
34	M	103	109	86	98	1.2	1.2	1.4	8	1.0	1.0	.9	-.6	1.2	.5	---	---	8	Pr. I	Pr. I
35	F	98	87	93	89	1.8	.5	4.0	8	1.2	---	2.0	1.6	.4	.3	---	---	8	Pr. I	Pr. I

TABLE 1 (PART 3)
NRM CASE-STUDY DATA

Gain Data

I.D. Number	Sex[a]	Age[b]	WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science &Social Studies	Interim[d]	Pretest	Post Test
36	M	109	84	97	89	1.0	.8	1.5	8	.6	.4	.5	.6	1.5	.4	---	---	8	Pr. I	Pr. I
37	M	121	101	76	99	1.0	-.3	.9	2	1.3	1.8	.8	2.7	.3	.6	---	---	8	Pr. I	Pr. I
38	F	91	92	104	98	.8	1.4	.5	8	.6	---	.7	.5	.8	.4	---	---	8	Pr. I	Pr. I
39	M	121	100	103	102	.1	.3	.4	2	.3	.2	.2	.4	.4	.5	---	---	8	Pr. I	Pr. I
40	M	123	97	86	91	.4	.2	1.4	5	---	---	---	---	---	---	---	---	-	-----	-----
101	M	127	91	89	94	1.4	1.1	.5	8	-.2	.6	.7	.1	0.0	.3	-.6	.9	7	Int. I	Int. I
102	F	78	124	108	118	2.1	.6	3.0	8	1.0	.8	.6	1.7	-1.4	-.4	---	---	8	Pri. I	Pri. II
104	M	135	105	104	105	.6	1.1	.1	8	0.0	1.5	1.0	---	.9	.8	.9	.4	7	Int. II	-----
106	M	121	113	99	107	.9	1.3	.9	8	.5	1.3	.1	---	---	1.5	3.3	---	7	------	------
109	F	104	92	97	94	1.0	1.5	.9	8	.5	.7	.1	.7	1.8	-.1	---	---	?	Pri. I	Pri. I
110	F	103	86	86	85	.8	.8	1.9	7	---	---	---	---	---	---	---	---	---	Int. I	------
113	M	127	105	121	114	N.A.	0.0	.5	7	-.1	1.3	.9	---	1.4	2.2	1.7	---	---	Int. II	------
111	F	115	96	107	101	2.1	.8	.9	7	----	----	---	---	---	---	---	---	---	------	------
112	F	107	109	113	112	1.2	.3	.6	7	.6	-.3	.6	1.7	1.2	1.5	.3	-.4	---	Int. I	Int. I
119	M	89	121	128	127	.4	1.4	1.1	5	.2	.2	---	.9	---	.5	---	---	8	Pri. I	Pri. I

Proger

TABLE 1 (PART 4)

NRM CASE-STUDY DATA

Gain Data

I.D. Number	Sex[a]	Age[b]	WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science & Social Studies	Interim[d]	Pretest	Posttest
120	M	82	137	117	130	1.0	1.5	2.5	7	1.1	.4	.3	.5	1.6	.7	---	---	--	Pri.I	Pri.I
121	M	81	109	120	115	.9	1.1	2.5	8	.9	1.3	.8	1.5	2.0	.8	---	---	8	Pri.I	Pri.I
122	M	89	110	104	108	1.0	.8	1.6	8	.8	.7	.2	.9	1.5	.3	---	---	--	Pri.I	Pri.I
123	M	82	116	106	112	1.2	1.8	.5	8	.7	-.2	.6	.6	1.2	.8	---	---	--	Pri.I	Pri.I
124	M	112	114	103	109	1.0	2.3	2.0	8	---	---	---	---	---	---	---	---	--	------	------
125	[redacted]		97	113	105	.9	2.9	1.8	5	---	---	---	---	---	---	---	---	--	Int.II	------
126	M	122	87	90	88	.7	1.5	1.6	7	1.3	1.5	.7	2.9	1.2	2.4	3.3	---	--	Int.II	------
127	M	90	94	115	104	0.0	.8	0.0	1	---	---	---	---	---	---	---	---	--	------	------
128	M	106	114	108	112	2.5	2.7	2.3	8	---	---	---	---	---	---	---	---	--	------	------
129	M	103	125	82	105	3.1	.8	.9	9	1.6	.7	1.6	.3	2.4	.9	2.0	---	--	Int.I	------
130	M	105	103	117	110	1.4	3.3	1.5	6	-.1	-.2	0.0	.4	.2	.7	1.3	---	--	Int.I	------
150	M	125	91	89	89	.2	.6	2.5	8	0.0	.2	.1	.2	1.1	.2	---	---	8	Pri.I	Pri.I
151	M	141	75	100	85	.5	-.5	1.0	8	1.1	.7	-.3	---	.9	.8	.9	---	8	Int.II	Int.II
152	F	121	75	65	67	1.2	1.8	1.1	7	.6	.1	.3	.5	0.0	.2	---	---	8	Pri.I	Pri.I
153	M	116	91	106	98	.7	-.2	1.0	7	.9	-.4	.6	.3	2.3	-.2	---	---	8	Pri.II	Pri.I

TABLE 1 (PART 5)

NRM CASE-STUDY DATA

Gain Data

I. D. Number	Sex[a]	Age[b]	WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science & Social Studies	Interim[d]	Pretest	Posttest
154	M	139	100	100	100	.8	1.1	1.2	3	1.7	.4	.3	.9	-1.9	1.3	---	---	8	Pri.I	Pri.II
155	F	101	N.A	N.A	N.A	.1	.8	1.6	8	1.4	1.9	.7	.1	.4	0.0	---	---	8	------	Pri.II
156	M	121	121	115	120	1.0	.2	2.8	8	1.0	2.4	-.5	2.4	3.7	.7	2.5	---	8	Pri.II	Int.I
157	F	97	80	67	71	1.1	.7	1.1	8	1.1	.8	.8	.9	.1	.9	---	---	8	Pri.I	Pri.I
158	F	147	111	108	111	.5	.3	2.4	15	1.1	2.0	1.2	.6	.8	-.7	.4	---	8	Pri.II	Int.I
159	M	151	86	85	84	1.3	-.3	1.7	7	1.3	0.0	1.2	-.4	-2.4	-.8	---	---	8	Pri.I	Pri.II
160	M	86	121	99	112	---	.4	3.7	8	1.2	1.2	1.3	3.5	.3	-.1	---	---	8	Pri.I	Pri.II
161	M	92	91	89	89	.1	.2	.6	-	.6	0.0	.8	.5	.8	.6	---	---	8	Pri.I	Pri.I
162	M	125	111	120	117	.9	1.3	1.9	12	1.2	1.4	.3	.8	-1.3	2.0	---	---	8	Pri.I	Pri.II
163	M	107	72	75	71	.3	0.0	.9	8	.8	2.6	2.4	1.7	1.0	.2	---	---	8	Pri.I	Pri.I
164	M	103	101	93	97	N.A	N.A	N.A	8	---	---	---	---	---	---	---	---	8	------	------
165	M	147	104	106	105	---	-.6	.9	8	N.A	---	---	---	---	---	---	---	8	------	------
166	M	92	97	85	91	.4	1.2	1.9	8	1.5	1.6	1.0	.5	1.9	1.1	1.2	----	8	Pri.II	Pri.II
200	F	99	79	72	73	1.0	1.3	.1	7	1.0	1.5	.7	2.8	2.0	1.9	1.7	1.3	9	Pri.II	Pri.II
201	M	121	95	101	98	.7	1.8	1.1	7	.7	.4	1.1	1.3	1.5	.9	1.2	.7	9	Pri.II	Pri.II
202	M	128	74	93	81	.3	1.7	.3	9	.3	.8	.7	1.2	.1	1.5	.8	.9	9	Pri.II	Pri.II

TABLE 1 (PART 6)

NRM CASE-STUDY DATA

Gain Data

I.D. Number	Sex[a]	Age[b]	WISC I.Q		WRAT - Gain Scores					SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science and Social Studies	Interim[d]	Pretest	Posttest
203	M	95	110	101	107	.6	.3	.4	2	.4	.8	.4	.4	.7	.2	.1	.1	1	Pri.II	Pri.II
204	M	110	82	89	84	.5	1.2	.4	8	.4	.2	---	.4	1.0	.6	---	---	9	Pri.I	Pri.I
205	M	143	76	82	77	.3	.3	.1	8	.2	.5	.1	.3	-.1	1.1	0.0	0.0	9	Pri.II	Pri.II
206	M	130	97	107	102	1.5	1.4	1.9	6	3.1	1.2	-.2	.3	-.7	1.4	2.5	.3	6	Pri.II	Pri.II
207	M	83	89	107	97	1.4	1.5	1.6	9	.7	1.1	1.5	2.7	.6	1.6	---	---	8	Pri.I	Pri.II
208	F	95	75	47	58	2.2	3.1	1.7	7	1.5	1.7	1.9	3.5	1.9	1.5	---	---	9	Pri.I	Pri.I
209	F	84	96	71	83	1.1	1.9	.8	15	1.4	1.5	1.6	.5	1.5	.4	---	---	5	Pri.I	Pri.I
210	M	127	79	92	83	.6	.9	1.4	17	1.8	2.1	-.1	.6	.4	.8	.6	.6	9	Pri.II	Pri.II
211	M	91	86	83	83	.9	.9	.8	8	.8	.9	.9	.4	.6	.5	---	---	9	Pri.I	Pri.II
212	M	102	97	110	104	.9	1.1	1.6	7	0.0	.4	1.1	.3	-.3	1.0	1.3	.5	9	Pri.II	Pri.II
213	M	90	86	97	91	1.0	1.1	1.9	6	.5	1.5	1.6	.9	2.4	.8	---	---	9	Pri.I	Pri.I
214	F	103	82	85	82	1.2	1.0	1.6	9	.3	.2	.2	1.6	1.9	---	---	---	9	Pri.I	Pri.II
215	M	93	115	80	99	.9	1.4	1.7	8	.6	.8	1.0	1.9	.7	1.2	---	---	9	Pri.I	Pri.II
216	M	114	89	76	81	1.8	-.8	2.8	8	-.3	0.0	-.2	1.4	-.1	.6	---	---	9	In. I	Pri.II
217	M	109	104	92	98	1.8	3.1	1.2	9	.2	1.2	.9	1.1	2.2	1.8	1.9	.3	8	Pri.II	Pri.II
218	M	100	101	97	99	.9	1.3	2.1	9	1.0	1.2	1.2	.4	1.2	.9	1.4	1.4	9	Pri.II	Pri.II
219	M	79	113	111	113	1.7	1.4	1.0	8	.9	1.7	.5	1.2	1.3	1.3	---	---	9	Pri.I	Pri.II
220	M	137	70	87	76	1.1	0.0	.3	9	.1	1.0	.3	.9	-.1	.2	-.2	1.3	9	Pri.II	Pri.II
250	M	129	N.A	N.A	N.A	.4	.7	1.7	8	.8	.2	.5	-.2	0.0	1.3	1.5	0.0	4	Pri.II	Pri.II
251	M	93	---	---	---	1.5	.8	1.9	8	.6	1.0	1.0	.4	.2	-.1	---	---	8	Pri.I	Pri.I
252	M	97	84	108	86	.5	.6	.9	8	.2	0.0	.3	.4	.2	0.0	---	---	5	Pri.I	Pri.I

TABLE 1 (PART 7)

NRM CASE-STUDY DATA

Gain Data

I. D. Number	Sex[a]	Age[b]	WISC I.Q.			WRAT - Gain Scores				SAT - Gain Scores									SAT Level	
			Verbal	Performance	Full-Scale	Spelling	Arithmetic	Reading	Interim[d]	Word Reading/ Word Meaning	Paragraph Meaning	Spelling	Word Study Skills	Vocabulary/ Language	Arithmetic/ Arithmetic Computation	Arithmetic Concepts	Science and Social Studies	Interim[d]	Pretest	Posttest
253	M	92	---	---	---	.9	.2	.8	8	.3	.3	.1	-.8	.3	.3	---	---	5	Pri.I	Pri.I
254	M	90	---	---	---	.8	.6	2.9	6	1.2	.8	1.0	.7	0.0	.1	---	---	5	Pri.I	Pri.I
255	M	117	110	108	110	1.1	-.4	2.9	4	-.8	-.4	.4	2.8	-.9	.3	.5	2.6	5	Pri.II	Pri.II
256	M	131	92	106	99	1.0	.7	---	7	.8	.6	.3	.2	2.0	.2	.2	.7	5	Pri.II	Pri.II
257	F	95	101	101	101	.7	.6	.6	6	.2	.5	.1	.2	-.6	.1	---	---	6	Pri.I	Pri.I
258	F	81	90	94	91	---	---	---	---	---	---	---	---	---	---	---	---	-	------	------
259	M	80	106	93	100	.5	1.4	1.1	8	---	---	---	---	---	---	---	---	-	------	------
260	F	124	89	103	95	.5	.6	1.3	8	.9	.9	.8	.2	1.0	.4	.1	.5	4	Pri.II	Pri.II
261	M	123	81	100	89	1.0	.6	1.4	8	.7	.2	.5	-1.2	.9	.3	1.4	.2	5	Pri.II	Pri.II
262	M	---	---	---	---	.5	.2	.7	6	.2	.5	.3	-.1	-.9	0.0	---	---	5	------	------
263	F	---	---	---	---	0.0	-.6	.1	4	.3	.6	.3	.3	.4	-.1	---	---	5	------	------
264	F	---	---	---	---	.4	1.0	.5	3	.1	.1	.4	.5	0.0	0.0	---	---	5	------	------

NOTE: The WRAT and SAT Scores represent gains in grade scores.

[a]For purposes of analysis, Male has been designated 1 and female 0.

[b]Age is given in months.

[c]Level I was used.

[d]Months between pre and posttest.

Proger

TABLE 2 (PART 1)

LIST OF READING OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
1	1	1	Sound symbol relationship of the letter A
	2	2	Sound symbol relationship of the letter M
	3	3	Sound symbol relationship of the letter R
	4	4	Use of " I am" "Am I"
	5	5	Sound symbol relationship of the letter T
	6	6	Use of Capital letters and the period and question mark
	7	7	Vocabulary usage
2	1	8	Vocabulary usage
	2	9	Usage of the comma
	3	10	Sound sumbol relationship of the letter S
3	1	11	Syllablication
	2	12	Sound symbol relationship of the letter N
	3	13	Vocabulary usage
	4	14	Usage of question marks
4	1	15	Sound symbol relationship of the letter L
	2	16	Vocabulary usage
	3	17	Sound symbol relationship of the letter F
	4	18	Sound symbol relationship of the letter B
	5	19	Usage of the exclamation mark
	6	20	Sound symbol relationship of the letter O
5	1	21	Sound symbol relationship of the letter H
	2	22	Vocabulary usage
	3	23	Sound symbol relationship of the letter G
6	1	24	Sound symbol relationship of the letter V
	2	25	Vocabulary usage
	3	26	Sound symbol relationship of the letter D
7	1	27	Sound symbol relationship of the letter I
	2	28	Vocabulary usage
9	1	29	Vocabulary usage
	2	30	Sound symbol relationship of the letter Z
10	1	31	Sound symbol relationship of the letter K
	2	32	Vocabulary usage
	3	33	Sound symbol relationship of the letter W
11	1	34	Sound symbol relationship of the letter P
	2	35	Vocabulary usage
12	1	36	Sound symbol relationship of the letter U
	2	37	Vocabulary usage
13	1	38	Vocabulary usage
	2	39	Sound symbol relationship of the letter C
14	1	40	Sound symbol relationship of the letter Y
	2	41	Vocabulary usage
	3	42	Sound symbol relationship of the letter J
15	1	43	Sound symbol relationship of the letter E
	2	44	Vocabulary usage
16	1	45	Sound symbol relationship of the letter X
	2	46	Vocabulary usage
	3	47	Sound symbol relationship of the letter Q

TABLE 1 (PART 2)

LIST OF READING OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
17	1	48	Beginning "L" consonant clusters
	2	49	Identification and usage of familar pattern endings
	3	50	Rhyming
	4	51	Usage of beginning "L" consonant clusters with familiar pattern endings
	5	52	Vocabulary usage
18	1	53	Beginning "R" consonant clusters
	2	54	Identification & usage of familiar pattern endings
	3	55	Rhyming
	4	56	Usage of beginning "R" consonant clusters with familiar pattern endings
	5	57	Vocabulary usage
19	1	58	Beginning "S" and "TW" consonant clusters
	2	59	Identification & usage of familiar pattern endings
	3	60	Rhyming
	4	61	Usage of beginning "S" and "TW" consonant clusters with familiar pattern endings
	5	62	Vocabulary usage
20	1	63	Identification and usage of ending consonant clusters(nd, st)
	2	64	Rhyming
	3	65	Vocabulary usage
21	1	66	Identification & usage of the ending consonant cluster "NT"
	2	67	Rhyming
	3	68	Vocabulary usage
22	1	69	Identification and usage of ending consonant cluster (mp, sk, sp, lp, lk, id, ft, pt)
	2	70	Rhyming
	3	71	Vocabulary usage
23	1	72	Identification & usage of double ending consonants (ll,ss,zz)
	2	73	Rhyming
	3	74	Vocabulary usage
24	1	75	Identification & usage of double ending consonants (ll, ss)
	2	76	Rhyming
	3	77	Vocabulary usage
25	1	78	Sound symbol relationship of long e spelled "E" & "EE"
	2	79	Forming regular plurals
	3	80	Vocabulary usage
26	1	81	Identification & usage of A-consonant - E patterns
	2	82	Identification of the silent E
	3	83	Vocabulary usage
	4	84	Contractions and abbreviations
	5	85	Identification & usage of e-consonant - e patterns
	6	86	Subject - verb agreement- "rs" "are" "was" "were"

TABLE 2 (PART 3)

LIST OF READING OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
27	1	87	Sound symbol relationship of "ee" in the medial position
	2	88	Vocabulary usage
	3	89	Identification and usage of "ee" words
	4	90	Usage of familiar beginning consonant clusters with A-consonants - E - patterns
	5	91	Usage of "Place where prepositions"
28	1	92	Subject verb agreement-present tense
	2	93	Vocabulary usage
	3	94	1 consonant - e- pattern
	4	95	Identification of the silent e
	5	96	Identification and formation of compound words
	1	97	Identification & usage of plurals with "S" sounds as /s/
	2	98	Identification & usage of plurals with "Z" sounded as /Z/
	3	99	Vocabulary usage
30	1	100	Sound symbol relationship of short "c"
	2	101	Function of the Signal e
	3	102	Identification & usage of 0-consonant _E patterns
	4	103	Sound symbol relationship of 0-consonant, E-pattern sounded as
	5	104	Sound symbol relationship of 0-consonant, E sounded as /z/
	6	105	Vocabulary usage
31	1	106	Identification and usage of 0-consonant e pattern
	2	107	Sound symbol relationship of "O" as in /love/
	3	108	Sound symbol relationship of "O" as in /move/
	4	109	Vocabulary usage
	5	110	Usage of past tense
	6	111	Exceptions to the signal "e" rule
	7	112	Sound symbol relationship of "O" as in /gone/
32	1	113	Identification & usage of U-consonant - E patterns
	2	114	Identification of the signal E
	3	115	Sound symbol relationship of U as in Hubel
	4	116	Identification & usage of short "M"
	5	117	Vocabulary usage
33	1	118	Identification & usage of the /are/ pattern
	2	119	Identification of exceptions to the /are/ pattern
	3	120	Identification and usage of the /ore/ pattern
	4	121	Sound symbol relationship of consonant digraph "sh"
	5	122	Vocabulary usage
34	1	123	Plural formation by adding "s" or "es"
	2	124	Sound symbol relationship of "o" as in /go/
	3	125	Sound symbol relationship of "o" as in /do/
	4	126	Sound symbol relationship of consonant digraph /th/
	5	127	Vocabulary usage
35	1	128	Sound symbol relationship of "oo" as in too
	2	129	Sound symbol relationship of "oo" as in good
	3	130	Vocabulary usage
36	1	131	Usage of /ed/ sounded as /d/

TABLE 2 (PART 4)

LIST OF READING OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
	2	132	Sound Symbol relationship of consonant digraph "wh"
	3	133	Usage of /ed/ sounded as /t/
	4	134	Identification of /ed/ as signifying past tense
	5	135	Vocabulary usage
37	1	136	Sound symbol relationship of consonant digraphs /ch/ & /th/
	2	137	Vocabulary usage
	3	138	Formation of plurals by adding s and "es"
38	1	139	Identification of /ed/ sounded as /d/ or /t/
	2	140	Usage of "ed" sounded as /id/
	3	141	Vocabulary usage
39	1	142	Sound symbol realtionship of consonant digraphing "ng"
	2	143	Sound symbol relationship of consonant digraph "nk"
	3	144	Vocabulary usage
40	1	145	Sound symbol realtionship of "ck"
	2	146	Formation of plurals by adding "es"
	3	147	Vocabulary usage
41	1	148	Formation of "ed" words which require doubling the final consonant
	2	149	Vocabulary usage
42	1	150	Usage of the "ing" ending
	2	151	Formation of "ing" words which require doubling the final consonant
	3	152	Vocabulary usage
43	1	153	Sound symbol relationship of "or"

TABLE 3 (PART 1)

LIST OF MATHEMATICS OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
1	1	1	Identification of sets and subsets
	2	2	Identification and usage of numerals 1-10
	3	3	One-to-one correspondence of sets
	4	4	Identification and usage of inequality symbols
	5	5	Concept of zero and the empty set
	6	6	Counting by units, and 2's 1-20
	7	7	Usage of a final number name
2	1	8	Partitioning of sets
	2	9	Missing addends
	3	10	Identification & usage of true, false, & open number sentences
	4	11	Coin values - pennies, dimes, nickels, quarters
	5	12	Counting to ten
	6	13	Single digit subtraction facts
	7	14	Commutative property of addition
3	1	15	Sums of 11 and 12
	2	16	Subtraction with minuends of 11 and 12
	3	17	Identification of days of the week
	4	18	Identification of month of the year
	5	19	Constructing a bar graph
	6	20	Plotting points, figures
4	1	21	Addition and subtraction facts through 18
	2	22	Commutative and associative properties of addition
	3	23	Solving single digit addition problems in several forms
	4	24	Subtracting " to a ten"
	5	25	Number families - single digit numbers
	6	26	Solving sums through 18 mentally
	7	27	Keeping score with single digits
5	1	28	Counting from 1-100 by units and tens
	2	29	Expanded notation - five digit numbers
	3	30	Telling time to the hr. and half hr.
	4	31	Identification of circle, square, rectangle, and triangle
6	1	32	Fractions: ½
	2	33	Number families: two digit numbers
	3	34	Addition and subtraction of two digit numbers to the decade
	4	35	Greater than, less than relationship of a two digit number
7	1	36	Solving number puzzles
	2	37	Coin values - up to half dollar
	3	38	Fractions: ¼
	4	39	Temperature - comparing and graphing
8	1	40	Identification of odd and even numbers
	2	41	Addition and Subtraction of 10's
	3	42	Two digit addition
	4	43	Linear measurement - feet and inches
9	1	44	Repeated addition sets of 2
	2	45	Repeated addition sets of 3
	3	46	Rounding to the nearest ten

TABLE 3 (PART 2)

LIST OF MATHEMATICS OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
10	1	47	Regrouping 10's - two digit algorithm
	2	48	Identification of symmetrical shapes
	3	49	Identification of Roman Numerals: 1-10
	4	50	Fractions 1/3
11	1	51	Linear measurement: whole and fractional inch units
	2	52	Two digit subtraction algorithm
	3	53	Repeated addition: sets of 4's
12	1	54	Place value: units and tens
	2	55	Coin values: making change
	3	56	Liquid measurement: cup, pint, quart
	4	57	Expanded notation: two digit numbers
13	1	58	Introduction of Roman numerals: 11-20
	2	59	Addition of 2 digits with 3 addends
	3	60	Multiplication by fives
	4	61	Missing factors: multiples of 5
14	1	62	Commutative property of multiplication
	2	63	Measurement: dozen, half dozen
	3	64	Fraction of a set: ½
	4	65	Fraction of a set: ¼
15	1	66	Identification of odd or even numbers and their sums
	2	67	measurement: weight
	3	68	Measurement: pound and half poind
	4	69	Addition on the number line-multiples of 5
	5	70	Subtraction of the number line - multiples of 5
	6	71	Word problems: ½ and ¼
15	7	72	Abbreviations for familiar units of measure
	8	73	Place value: units, tens, hundreds
16	1	74	Talking time: half and quarter hour
	2	75	Addition tables
	3	76	Associative property of addition
	4	77	Solving incomplete subtraction problems
	5	78	Addition of one digit nos. - three addends
17	1	79	Identification of subsets
	2	80	Inequalities - single digit combinations
	3	81	Identification of sets
	4	82	Multiplication: multiples of 2
	5	83	Commutative property of multiplication
	6	84	Division symbols and algorithms
	7	85	Division: Divisor of 2
	8	86	Number families: Division and Multiplication
	9	87	Multiplication: multiples of 3
	10	88	Division: divisor of 3
18	1	89	Regrouping algorithm
	2	90	Writing dates and their abbreviations
	3	91	Figure representation of fractions: ½, 1/3, ¼
	4	92	Fractions: numberline values halves, thirds, fourths

TABLE 3 (PART 3)

LIST OF MATHEMATIC OBJECTIVES:
ORIGINAL NUMBERING AND
EXPERIMENTAL (NEW) NUMBERING

Monitor Number	Monitor Original Number	New Objective Number	DESCRIPTION
	5	93	Number scores 0-100
19	1	94	Multiplication: multiples of 2
	2	95	Division - Divisors of 2
	3	96	Fraction of a set: ½
	4	97	Coin values up to one dollar
	5	98	Multiplication: multiples of 3
	6	99	Division: Divisors of 3
	7	100	Fraction of a set: 1/3
20	1	101	Identification of simple curves
	2	102	Identification of open and closed curves
	3	103	Number sequence 0-100
	4	104	Multiples of 100 between 0 and 100
	5	105	Multiples of 10
	6	106	Subtraction: 2 digit numbers even decades
	7	107	Number families - 2 digit numbers
	8	108	Place value - units, ten, hundreds.
	9	109	Addition: regrouping tens
	10	110	Subtraction - regrouping tens

TABLE 4

BACKGROUND VARIABLE MEANS AND MEAN GAINS ACHIEVED UNDER SELF-CONTAINED AND RESOURCE ROOM APPROACHES

Variable	Self-Contained [a]	Resource Room [b]
Descriptive Background Data		
Chronological Age	102.00	108.30
WISC Verbal IQ	100.50	97.32
WISC Performance IQ	100.54	97.30
WISC Full-Scale IQ	101.07	97.00
Gain Data		
WRAT Spelling	0.84	0.95
WRAT Arithmetic	0.70	0.95
WRAT Reading	1.32	1.36
SAT Word Reading or Word Meaning	0.84	0.71
SAT Paragraph Meaning	1.00	0.80
SAT Spelling	1.04	0.64
SAT Word Study Skills	1.28	0.87
SAT Vocabulary/Language	0.93	0.69
SAT Arithmetic/Arithmetic Computation	0.83	0.67
SAT Arithmetic Concepts	1.31	1.15
SAT Science & Social Studies	1.16	0.65

Continuation of Table 4

Note.-- Gain data is given in grade-equivalent scores.

[a]N=29 except in cases of missing data (see Table 1, I.D. Numbers 1 to 40, to determine exact N for any given subtest)

[b]N=74 except in cases of missing data (see Table 1, I.D. Numbers 101 to 264, to determine exact N for any given subtest)

FIGURES

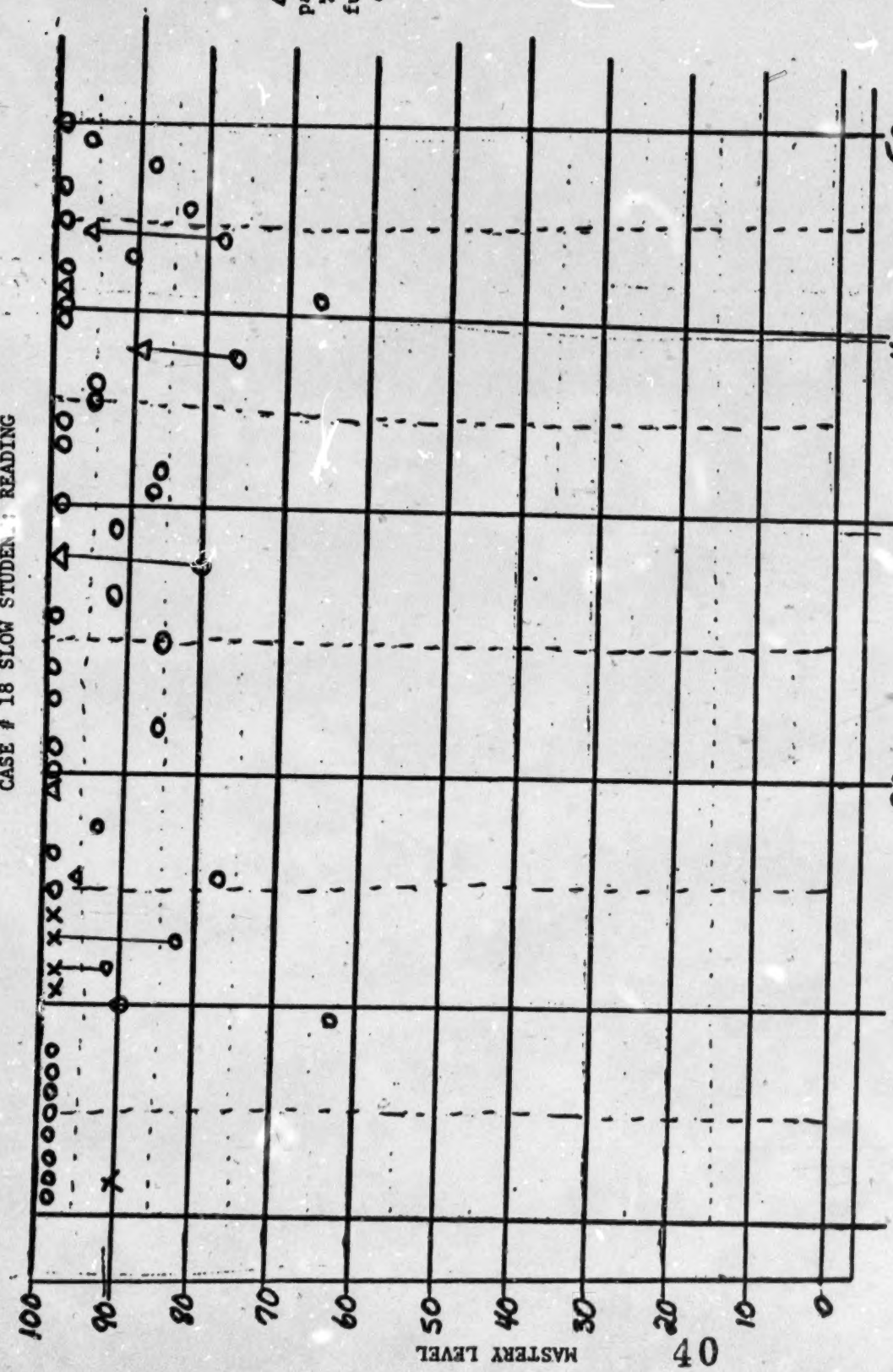


FIGURE 1 (PART 1)
LONGITUDINAL CASE STUDY: CRM DATA
CASE # 18 SLOW STUDENT: READING

FIGURE 1 (PART 2)
LONGITUDINAL CASE STUDY: CRM DATA
CASE # 18 SLOW STUDENT: READING

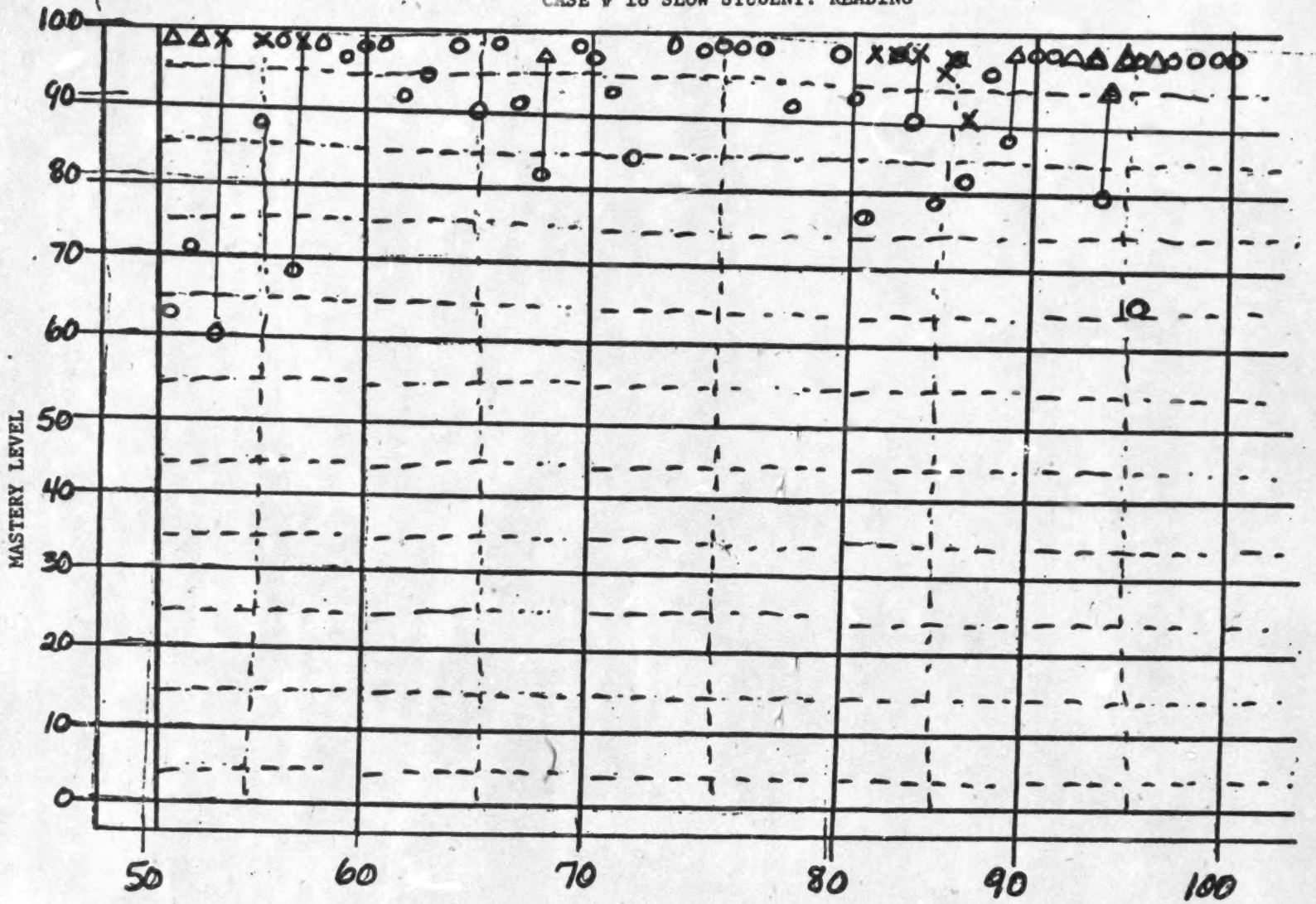


FIGURE 1 (PART 3)
LONGITUDINAL CASE STUDY: CRM DATA
CASE # 18 SLOW STUDENT: READING

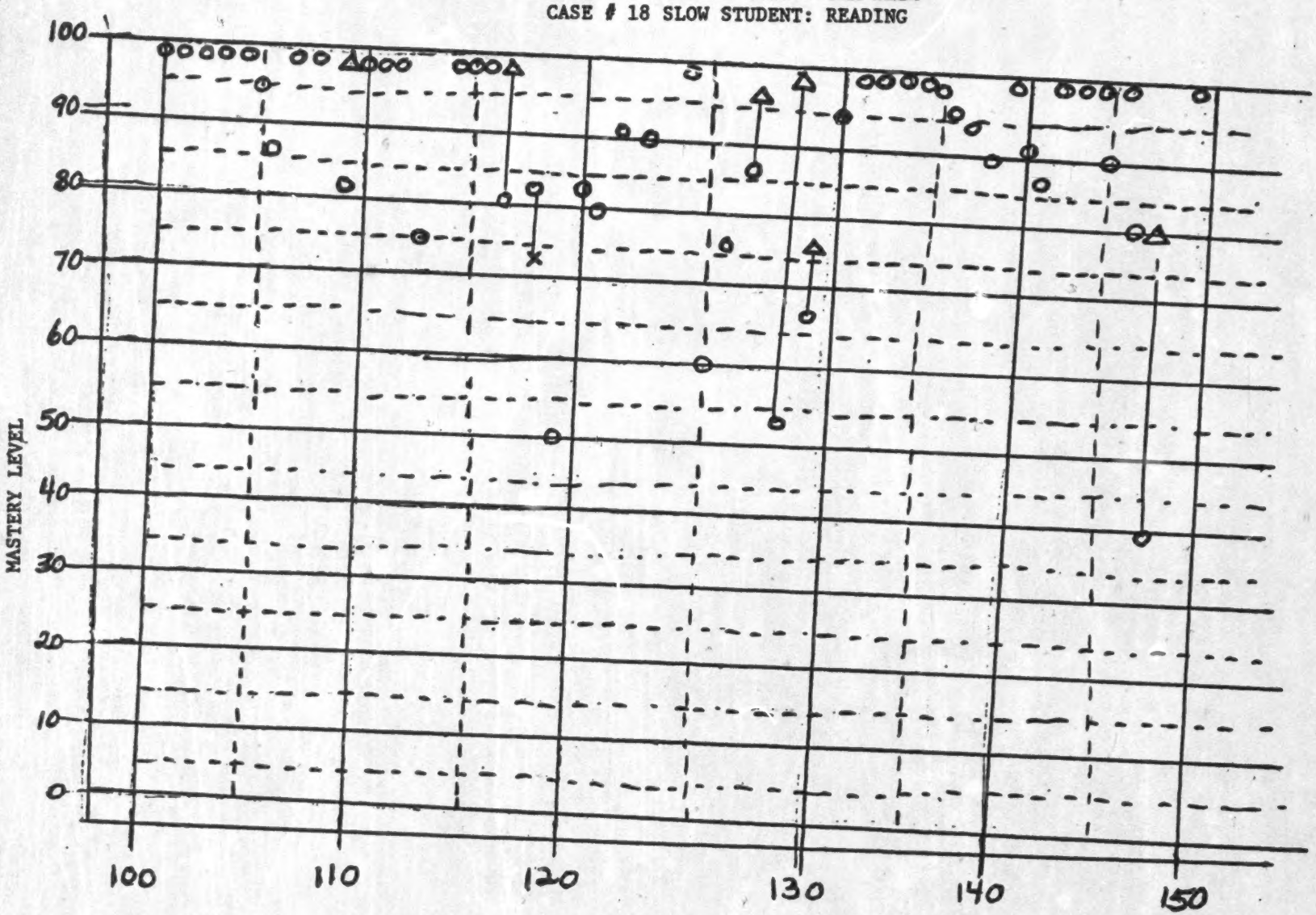


FIGURE 2 (PART 1)
LONGITUDINAL GROUP PROFILE: CRM DATA
READING

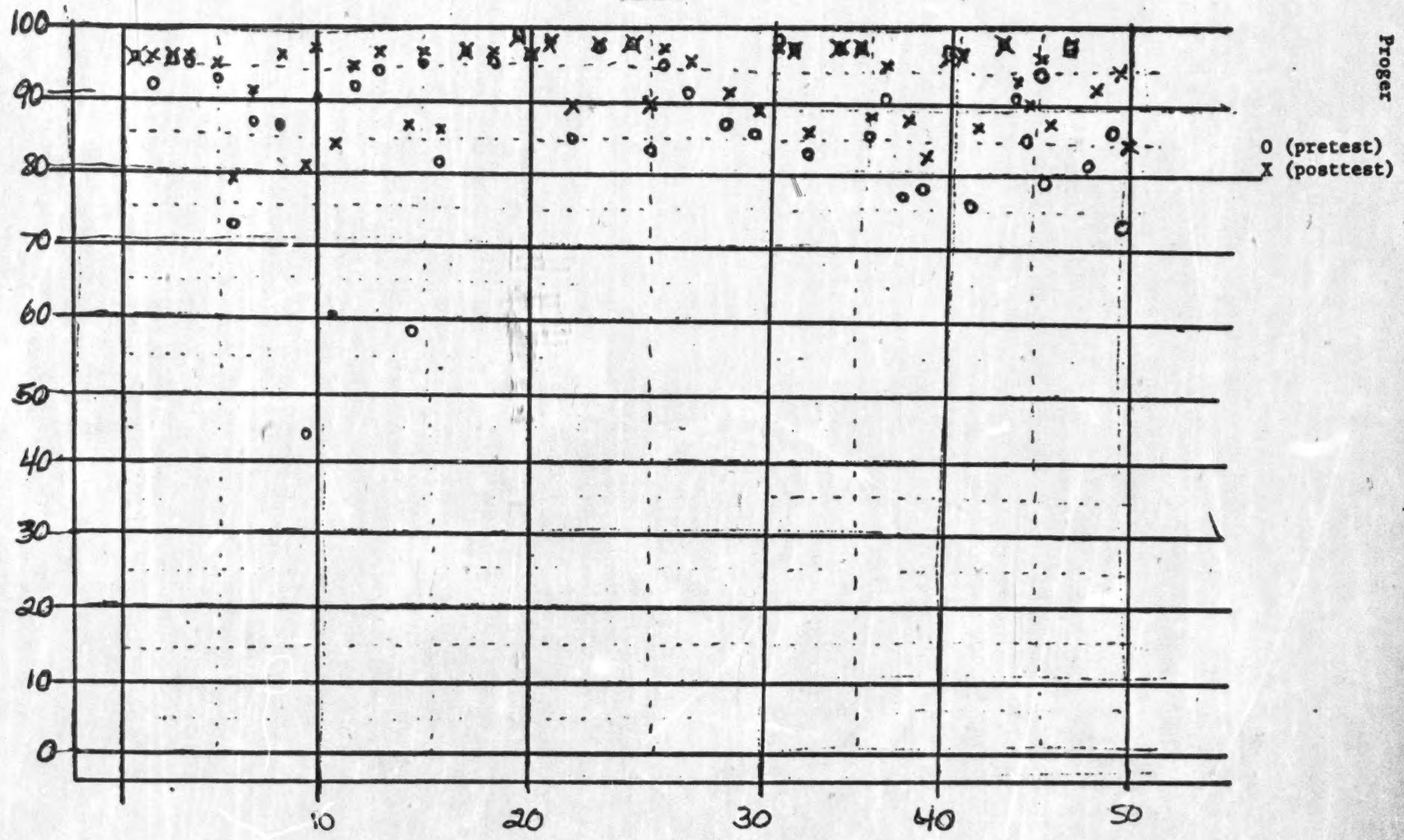


FIGURE 2 (PART 2)
LONGITUDINAL GROUP PROFILE: CRM DATA
READING

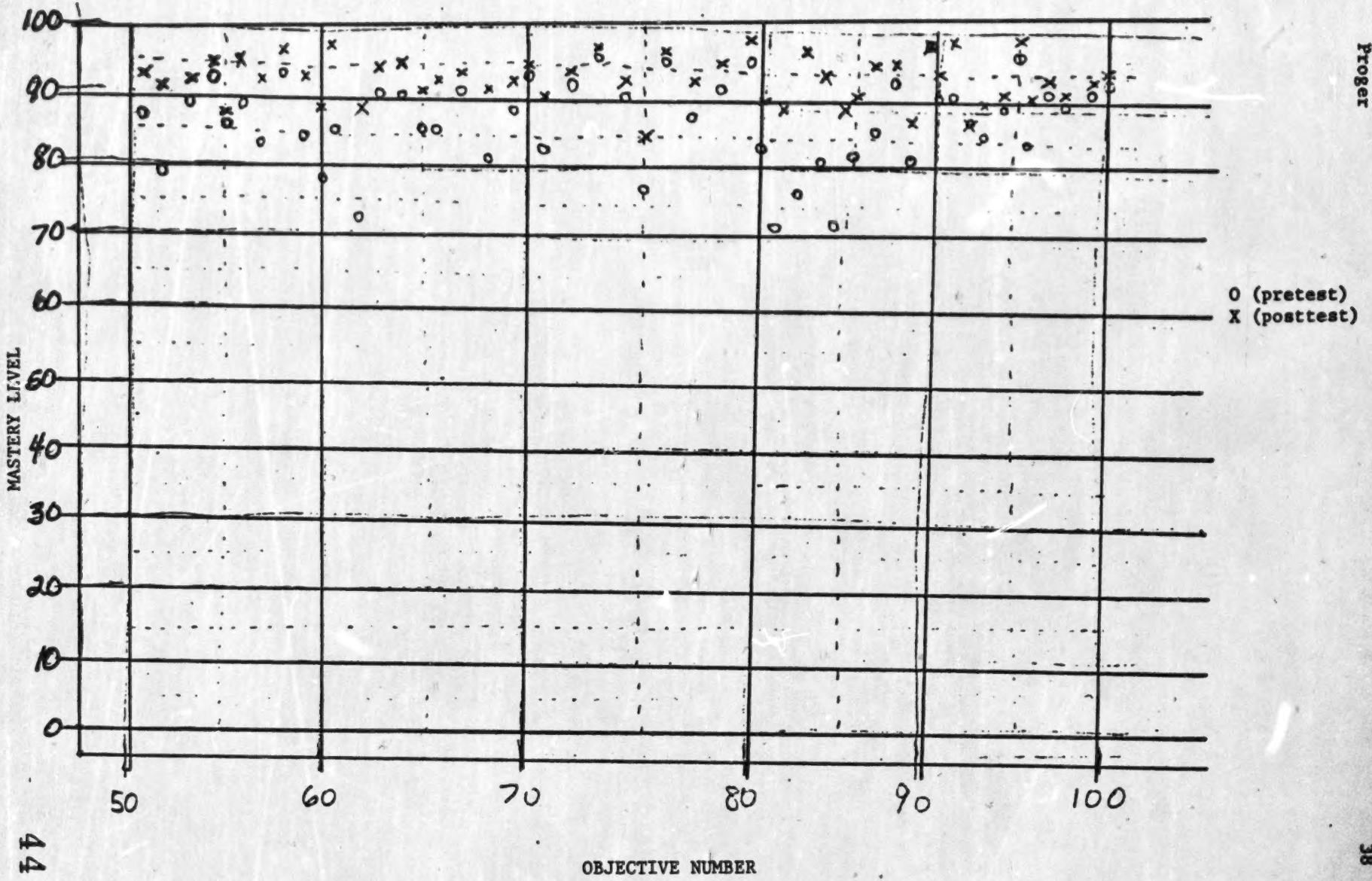


FIGURE 2 (PART 3)
LONGITUDINAL GROUP PROFILE: CRM DATA
READING

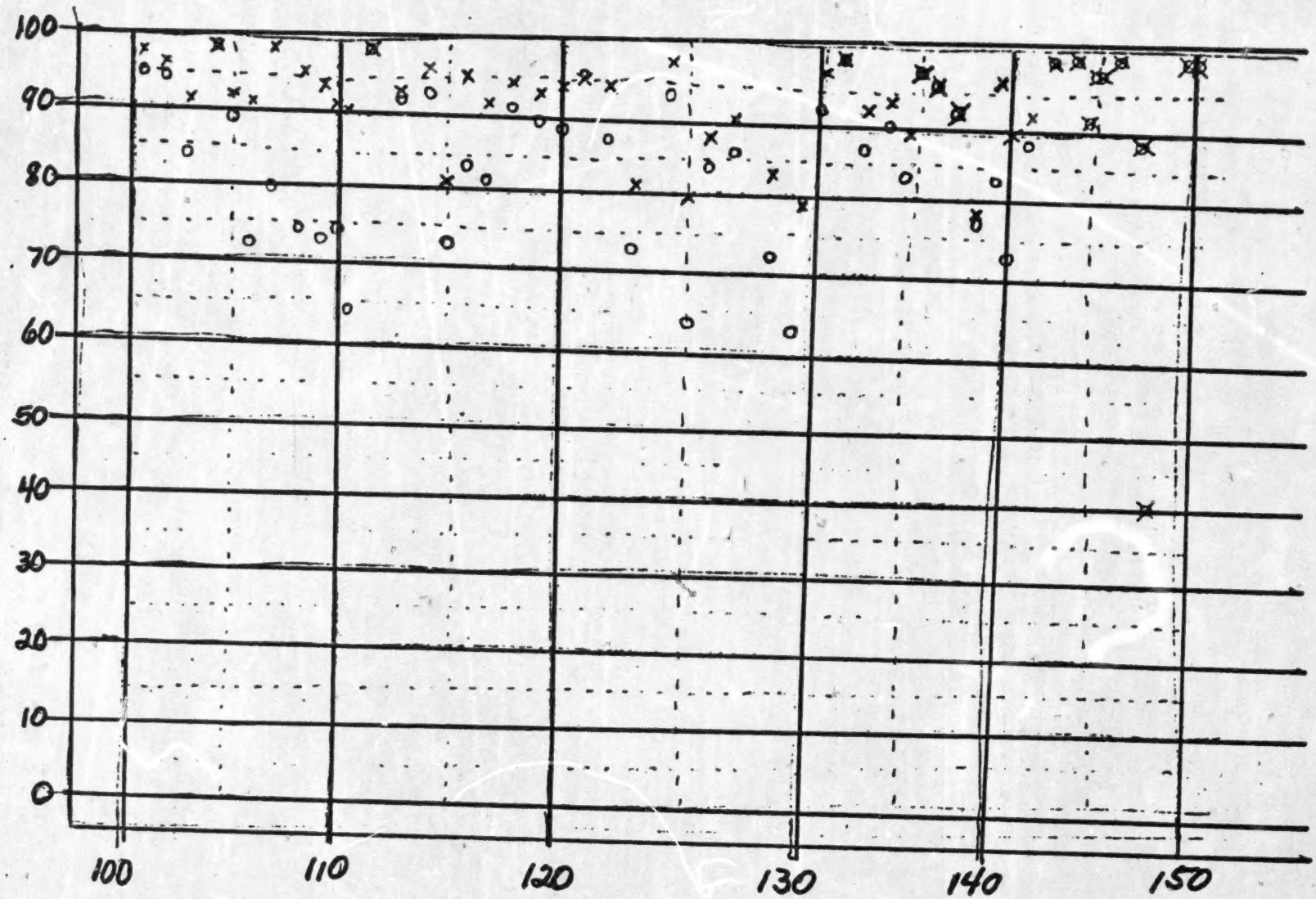


FIGURE 2 (PART 4)
LONGITUDINAL GROUP PROFILE: CRM DATA
READING

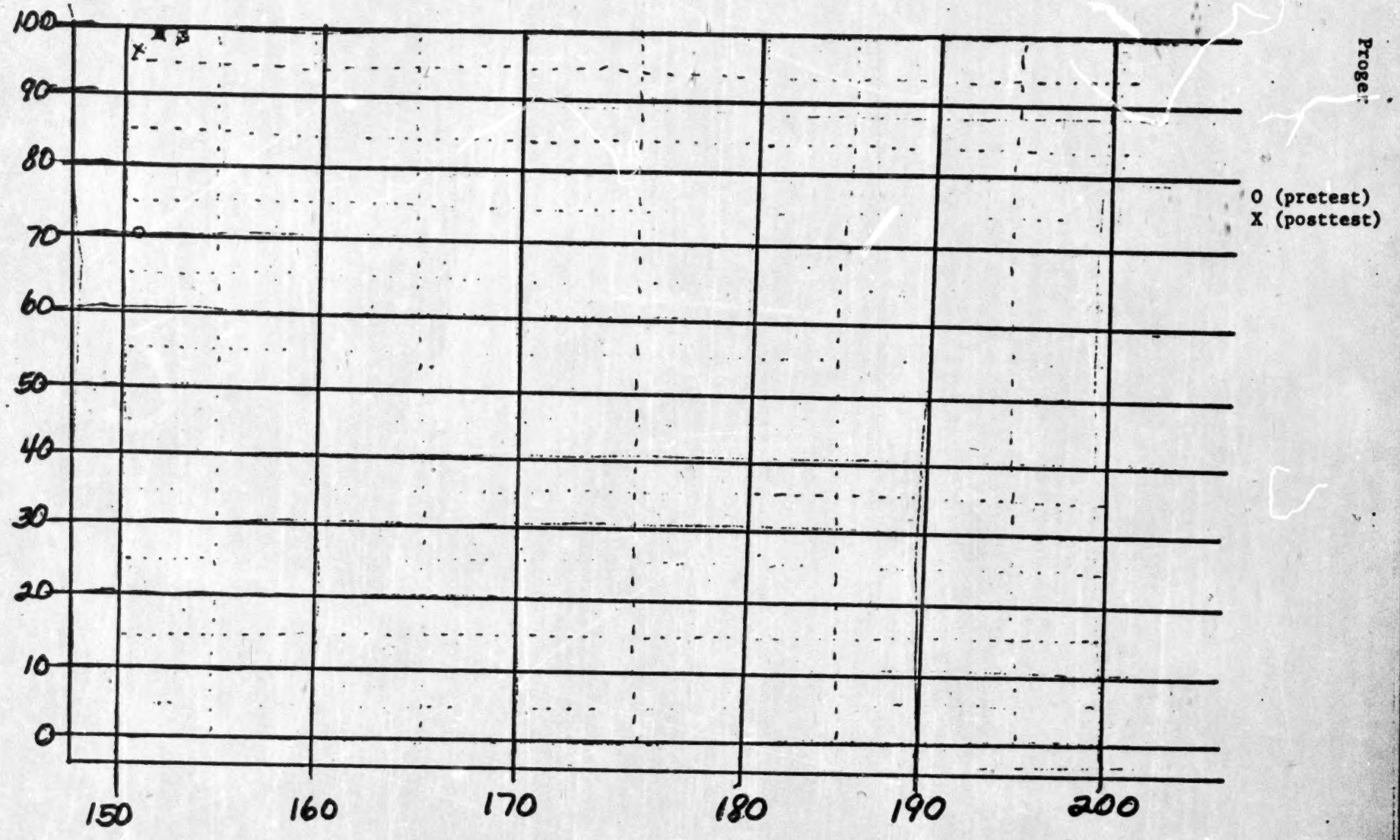


FIGURE 3 (PART 1)
LONGITUDINAL GROUP PROFILE: CRM DATA
MATHEMATICS

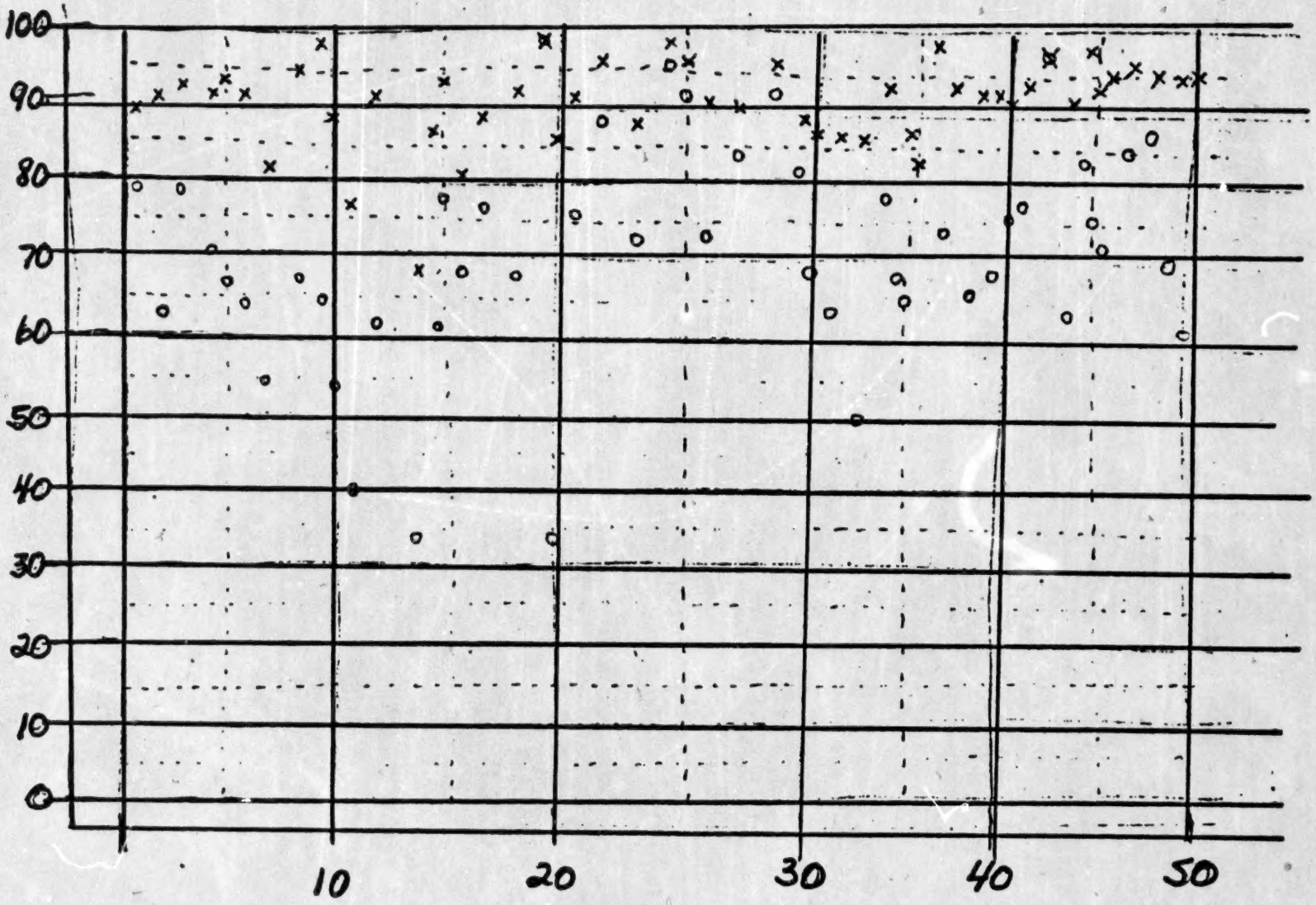
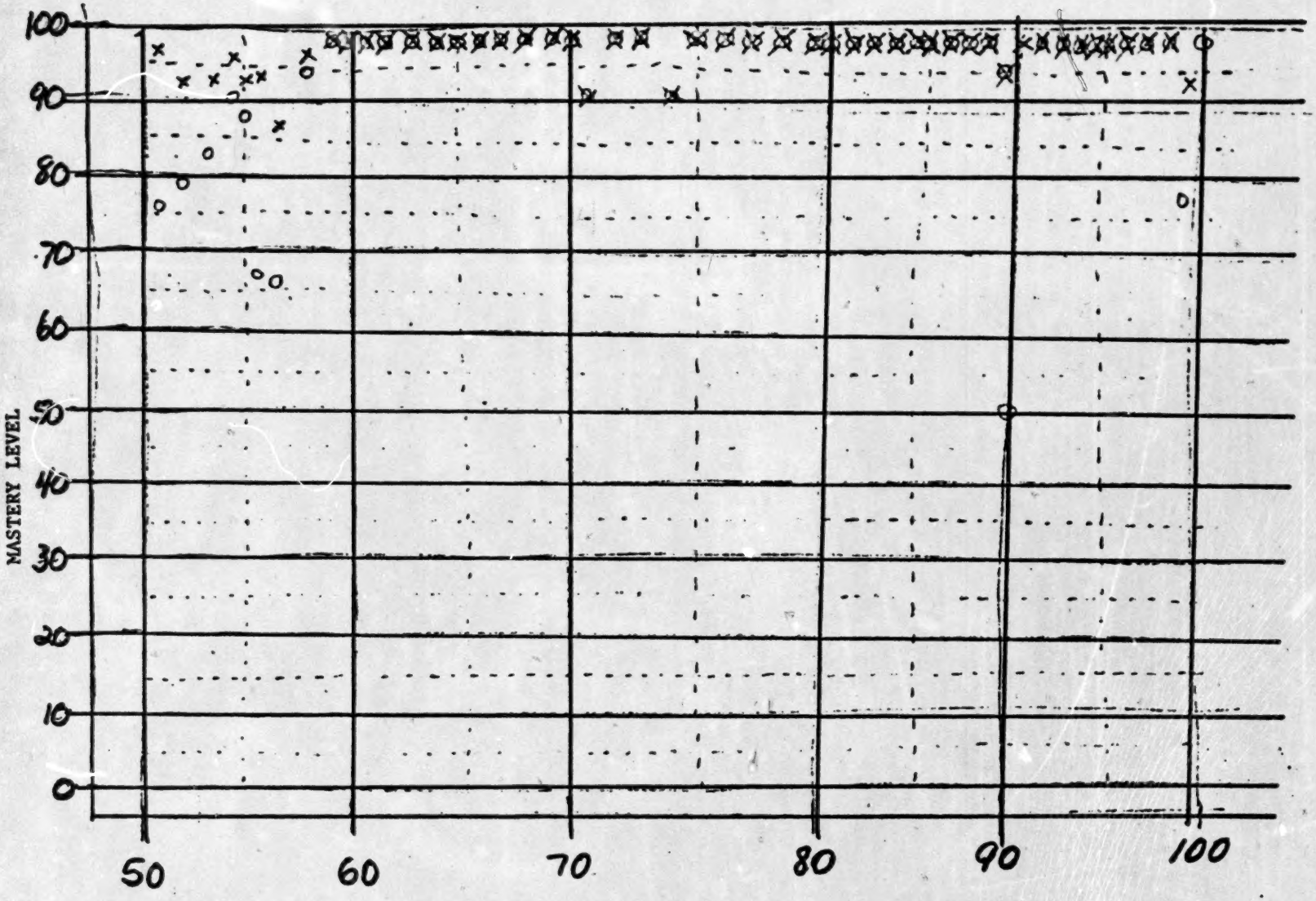


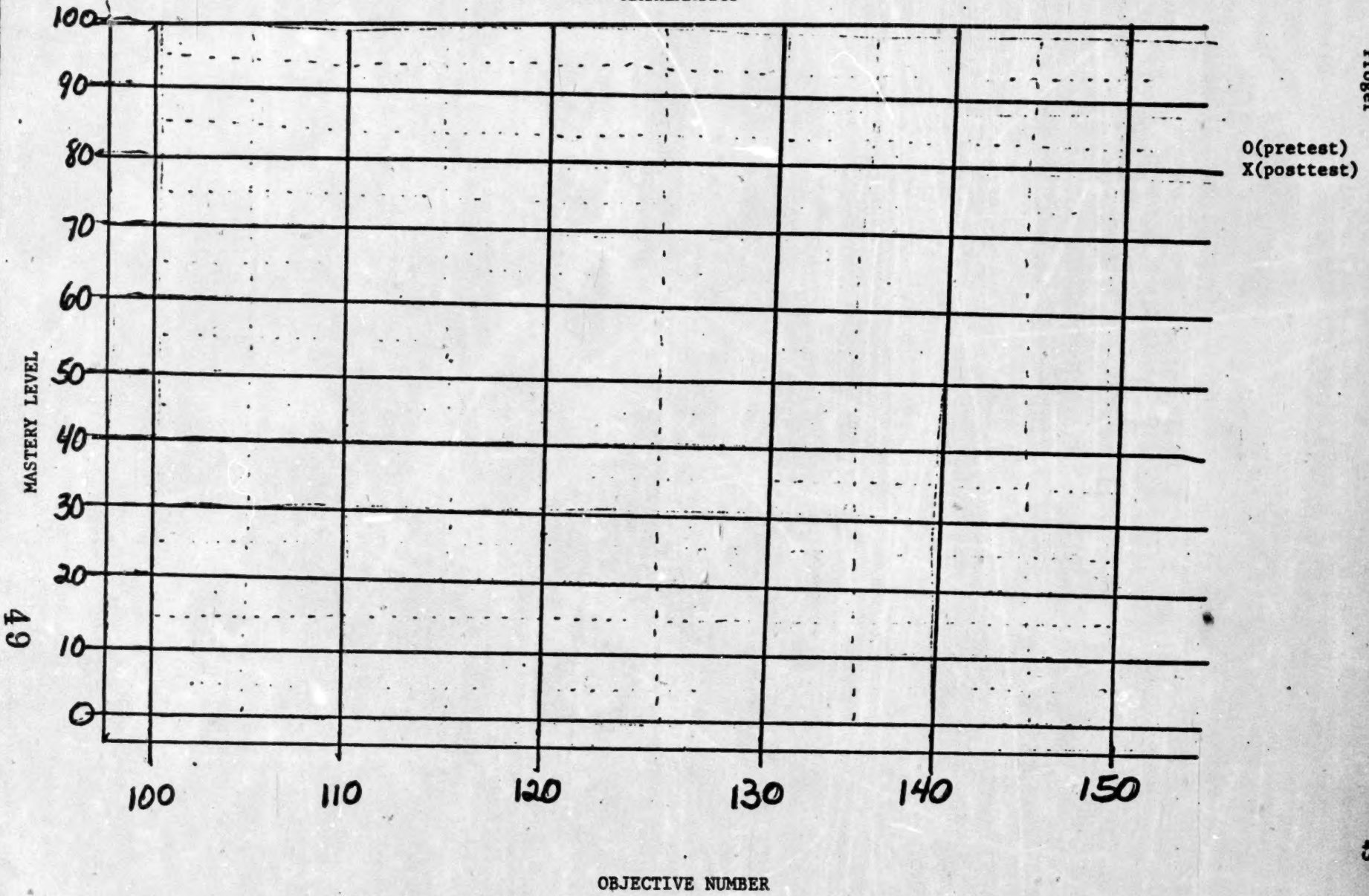
FIGURE 3 (PART 2)
LONGITUDINAL GROUP PROFILE: CRM DATA
MATHEMATICS



Proger

FIGURE 3 (PART 3)

LONGITUDINAL GROUP PROFILE: CRM DATA
MATHEMATICS



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